

## Test

1

Total mark

10

### Question 1

(5 marks)

#### A Put (✓) or (X) :

- 1 Lithium is the most active metal in group (1A). ( )
- 2 Liquefied nitrogen is used in the preservation of cornea of the eye. ( )
- 3 Water density increases on freezing. ( )
- 4 Hofmann's voltmeter is used for the electrolysis of acidified water. ( )

#### B Give a reason for the following :

Elements of group (7A) are known as halogens.

.....

.....

### Question 2

(5 marks)

#### A Choose the correct answer :

- 1 The strongest metal lies in group .....  
 (a) 1A                      (b) 2A                      (c) 6A                      (d) 7A
- 2 The outermost energy level of any halogen contains ..... electrons.  
 (a) 1                      (b) 2                      (c) 6                      (d) 7
- 3 There are ..... bonds among water molecules.  
 (a) ionic                      (b) hydrogen                      (c) covalent                      (d) metallic
- 4 The volume of hydrogen gas evolving from acidified water electrolysis equals ..... the oxygen volume.  
 (a) four times                      (b) half                      (c) twice                      (d) three times

#### B What happens if ... ?

Water is polluted with arsenic.

.....

.....

## Test

## 2

Total mark

10

## Question 1

(5 marks)

**A Write the scientific term of each of the following :**

- 1 The halogen which exists in a solid state. (.....)
- 2 The metalloid which is used in the manufacture of electronic devices. (.....)
- 3 A type of weak electrostatic attraction which arises among molecules of some polar compounds. (.....)
- 4 Water pollutant which causes the death of brain cells. (.....)

**B What happens if ... ?**

Sodium reacts with water.

.....

.....

## Question 2

(5 marks)

**A Complete the following sentences :**

- 1 Rubidium and cesium ..... in water as their densities are ..... than water density.
- 2 Chlorine can replace ..... and ..... in their salt solutions.
- 3 Pure water boils at ..... °C and freezes at ..... °C.
- 4 The bond between hydrogen atom and oxygen atom in a water molecule is ..... bond, while bonds among water molecules are ..... bonds.

**B Give a reason for :**

Although sugar is a covalent compound, it dissolves in water.

.....

.....

## Answers of Test

### 1

### Question

### 1

A 1 (X)

2 (✓)

3 (X)

4 (✓)

B Because they react with metals forming salts.

### Question

### 2

A 1 (a)

2 (d)

3 (b)

4 (c)

B The infection rate by liver cancer increases.

## Answers of Test

### 2

### Question

### 1

A 1 Iodine.

2 Silicon.

3 Hydrogen bonds.

4 Lead.

B Hydrogen gas evolves which burns with a pop sound.

### Question

### 2

A 1 sink – higher

2 bromine – iodine

3 100 – 0

4 covalent – hydrogen

B Because sugar molecules can form hydrogen bonds with water molecules.

## Science prep.2

November revision 2022-2023**Q.1 :Write the scientific term**

1. The most active metal . [ ]
2. A gas that is used in cornea preservation . [ ]
3. Non- metal elements are not exist in nature in elementary state . [ ]
4. The element which has the largest atomic size . [ ]
5. Group of elements react with water forming alkaline solution [ ]
6. bond responsible for the abnormal property of water molecules .[ ]
7. A kind of water pollution results from discharging of factories residues [ ]
8. The angle between the two covalent bonds in water .[ ]
9. The bond which links the molecules of water . [ ]
10. Pollution causes rises in water temperature [ ]
11. An element used in liquid state inside nuclear reactor [ ]
12. An instrument used in water electrolysis [ ]
13. An element used in the preservation of cornea of eye [ ]
14. A positive pole in Hoffman voltameter [ ]
15. A kind of water pollution resulted from human activites [ ]
16. The addition of any substance to water that causes change in water properties and affect on living organisms health [ ]
17. An element used in food preservation [ ]
18. A water pollutants that causes death of brain cells [ ]
19. A gas which evolves at cathode during water electrolysis[ ]
20. A halogen in liquid state [ ]
21. A kind of ions which are formed by alkali metals during chemical reactions [ ]



## Q.2 Complete the following

1. .... used to transfer the energy from inside the reactor to outside
2. The chemical activity of alkali metal .....as the .....increases
3. ....emits.....rays which prevent the reproduction of microbial cells .
4. As the atomic number increases in group “ 1 A” , the atomic size .....,
5. the metallic property .....when the electro negativity .....
6. Lithium element .....in water as its density .....than that of water .
7. Alkaline metals react with water to produce .....gas .
8. Metal oxides are called .....while non – metals oxides are called.....
9. is used in the manufacture of electronic slides .....
10. Valency of group 1A is .....while group 18 is .....
11. water molecules consist of .....atoms and ... .....atom
12. The density of water in .....state is lower than its density in .....state
13. The hydrogen bond is .....than covalent bond
14. ....is a good polar solvent.
15. the bond between hydrogen atom and oxygen atom in water is .....
16. Water has .....boiling point .
17. ....is the positive pole of Hoffman’s voltmeter .
18. Water has .....effect on litmus solution .
19. Mixing of animals and human wastes with water leading to the infection by many diseases such as .....and .....
20. ....is a kind of water pollution results from mixing of humans and animals wastes with water .
21. ....and.....are from water pollutants .
22. water is considered as a good .....solvent .
23. In Hoffman voltameter oxygen gas evolved at .....

### Q.3 Give reason for :

1-the metals of group (1A) are called alkali metals.

.....  
.....

2- Although Hydrogen gas exists in group (1A) it is a non-metal.

.....

3- Some of alkali metals are kept under kerosene or paraffin.

.....

4- Lithium is kept under Paraffin not kerosene.

.....

5- Alkali metals are monovalent elements.

.....

6- elements of group (17) are called Halogens.

.....

.....

7- Chlorine is used in the manufacture of correction substances.

.....

8- elements of group (17) are monovalent elements.

.....

9- elements of group 17 don't exist individually.

.....

10- Sodium is used in its liquid state as it is a good conductor of heat.

.....

11- Silicon slides are used in the manufactures of computers.

.....

12- Liquified Nitrogen is used in the preservation of cornea.

.....

13- the radioactive cobalt is used in food preservation.

.....

14- -A weak electrostatic attraction originated between water molecules which are called hydrogen bonds.

.....

15- the abnormality of water properties.

.....

16- water is a unique substance.

.....

17- Rising of the boiling point of water.

.....

18- the density of water when it is in solid state is lower than when it is a liquid state.

.....

.....

.....

19- Swimming in the sea is easier than swimming in the pole.

.....

20- Water is neutral liquid.

.....

21-Mixing human and animal wastes of water cause many diseases.

.....

22-water which used in the cooling of the nuclear reactors destroys the marine organisms found in it.

.....

.....

**Q.4:What is the importance of? :**

1. Silicon

.....

2. Sodium

.....

3. Liquefied Nitrogen

.....

4. Cobalt 60

.....

5. Hydrogen bonds in water.

.....

6. Hoffman voltameter device

.....

**Q.5:What happens by adding :**

7. Chlorine to sodium bromide .....

2. potassium to bromine ,.....

**Q.6 :What's meant by :**

1. Hydrogen bond :

.....

2. Water pollution :

.....

3.Halogens :

.....

4. chemical pollution

.....



**Q.7 From the opposite figure , answer the following questions :-**

1. What is the name of this apparatus? .....

2. Label the numbers (1) , (2) , (3) , (4) and (5) .

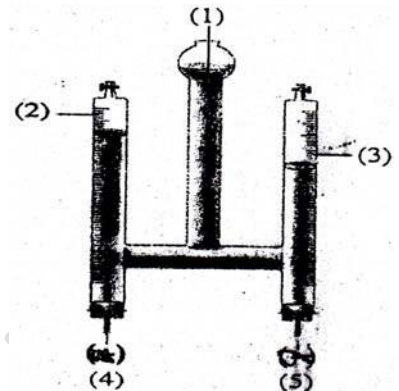
3. What happens if a glowing splint is put above the anode and the cathode ?

.....

.....

4. Calculate the volume of the gas that evolves at cathode if the gas at anode =  $2\text{cm}^3$

.....

**Q.8: From the opposite fig. answer the following questions**

1- what is the name of this group ?

.....

2- what is the valency of the elements of this group?

.....

3- what is the importance of element (Y)

.....

X
Y
Z
L
M

**Q.9: Study the following elements then answer the following questions**

1- which element react strongly with water

$(_{11}\text{X}), (_{17}\text{Y}), (_{14}\text{Z})$ .

.....

2- Which element can replace iodine in potassium iodide solution

.....

3- Enter in the manufacture of electronic slides

.....

4- Choose two elements when they react together, they form a salts

.....

**Q.10 the opposite fig. represent Hoffman voltameter answer the following questions**

1- Write the chemical equation that represent the reaction

.....

2- What is the volume of gas which burn with a pop sound

If the volume of the other gas =  $10 \text{ cm}^3$  ?

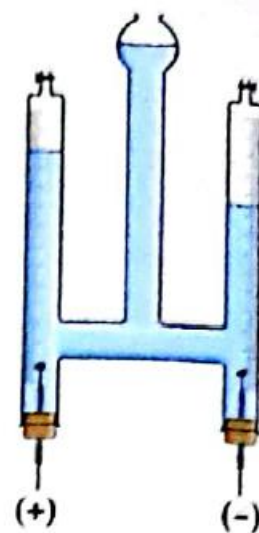
.....

3- What is the name of the collected gas at anode and cathode?

.....

4- What is the importance of this apparatus?

.....

**Q.11: Look at the following elements then answer the following questions**

1- What is the type of this water pollution?

.....

2- What happen if there is increasing in the ratio of :

A ) arsenic element .....

B ) Lead element .....

**Q.12 :answer the following questions**

1-arrange the following elements :

a) Ascendingly according to the degree of chemical activity

( Sodium – Rabidium – Lithium – Cesium )

b) Ascendingly according to the density :

(Na - K – Li – Rb – Cs )

**Q.13: Study the following table then answer the following questions**

[illegible]

- 1- What is the kinds of elements (X) - (M ) – (D)  
.....
- 2- Mention the element which represent :
  - a) The most active element in group 1A  
.....
  - b) Halogen element  
.....
  - c) Inert gas  
.....
  - d) The element that has the largest atomic size  
.....

**Q.14 :Look at the following elements then answer the following questions**

- 1- What is the type of this water pollution?  
.....
- 2- What is the name of diseases that is caused by  
this type of water pollution?  
.....
- 3- Mention two methods of water protection



## Answers

### Q.1 :Write the scientific term

1. Cesium
2. Liquefied nitrogen
3. Halogens
4. Cesium
5. Alkali metals
6. Hydrogen bond
7. Chemical pollution
8. 104.5
9. **Hydrogen bond** .
10. Thermal pollution
11. Sodium
12. Hoffman voltameter
13. Liquefied nitrogen
14. Anode
15. Artificial pollution
16. Water pollution
17. Cobalt 60
18. Chemical pollution
19. Hydrogen
20. Bromine      21- positive ion

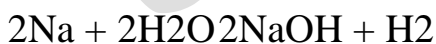
### Q.2

1. Liquefied sodium
2. Increase – atomic size
3. Cobalt 60 – gamma rays

4. increase
5. decrease – increase
6. floats - less than
7. Hydrogen
8. Basic - Acidic
9. Silicon
10. Mono valent – zero
11. Two hydrogen – one oxygen
12. Solid – liquid
13. weaker
14. water
15. single covalent
16. high .
17. anode .
18. neutral .
19. Bilhazia – typhoid
20. Biological
21. Chemical and thermal
22. Polar
23. Anode

### **Q.3 Give reason for :**

1-Because they react with water forming alkali solutions.



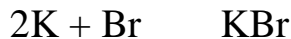
2- Because its atom is remarkably small and it is a gaseous element.

3-To prevent their reaction with moist air.

4- Because it floats on the surface of kerosene and it is immediately burns.

5- Because they contains one electron in the outer most energy level.

6- Because they react with metals forming salts.



7- Because it is a very volatile liquid.

8- Because they gain one electron during the chemical reactions

9- Because they are chemically active.

10- Because it is used in the transferring heat from inside the nuclear reactor to outside.

11- Because they are semiconductors which their conductivity of electricity depends on the temperature.

12- Because it has a very low boiling point ( $-196^{\circ} \text{C}$ ).

13- Because it emits gamma rays which prevent the reproduction of microbial cells.

14- Due to the large electronegativity of oxygen compared with hydrogen.

15- Because of the presence of hydrogen bonds between its molecules.

16- Because its existence in the three states at the ordinary temperature.

17-Due to the presence of hydrogen bonds.

18-Because when it is in the temperature lower than  $4^{\circ} \text{C}$ , the water molecules are collected by hydrogen bonds forming hexagonal crystals with many spaces between them.

19- Because the density of salty water is higher than density of the fresh water.

20- Because when it is ionizes it gives equal numbers of positive hydrogen ions and negative hydroxide ions. ( $\text{H}^{+} = \text{OH}^{-}$ ).

21-Because it cause the biological pollution which makes (Bilharzia – typhoid – hepatitis)

22-because it rises the temperature of water

#### **4- What is the importances of :**

1. Used in the manufacture of electronic slides as computer and transistors
2. used to transfer heat energy from inside the reactor to outside
3. Used in preserving cornea of eye



4. Used in preserving food
5. bond responsible for the abnormal property of water molecules.
6. Used in water electrolysis

### **5- What happens by adding :**

1. Chlorine can replace bromine and sodium chloride is formed



2. potassium bromide salt is formed



### **6- What's meant by :**

1. It is a type of electrostatic attraction that originates between the molecules of polar compounds
2. The addition of any substance to water that causes change in water properties and affect on living organisms health
3. Halogens they are non-metal elements located at the left side of periodic table before inert gases
4. A kind of water pollution resulted from discharging factories wastes and sewage in rivers ,seas and canals

### **Q.7:**

1. Hoffman voltameter
2. (1) acidified water , (2) oxygen gas ,  
(3)hydrogen gas , (4) anode (5) cathode .
- 3- Above the anode its glowing will increase

Above the cathode it will burn with pop sound

4.  $4\text{cm}^3$

**Q.8:**

1. Alkali metals
2. mono valent
3. used to transfer heat energy from inside the reactor to outside  
.....

X
Y
11
Z
L
M

**Q.9:**

- 1- X
- 2- Y
- 3- Z
- 4- X and Y  
.....

$(_{11}\text{X}), (_{17}\text{Y}), (_{14}\text{Z}).$

**Q.10**

1.  $2\text{H}_2\text{O} \xrightarrow[\text{Dil. H}_2\text{SO}_4]{\text{Electrolysis}} 2\text{H}_2 + \text{O}_2$
- 2 :  $20 \text{ Cm}^3$
- 3- at anode oxygen - at cathode hydrogen ?
- 4-Analysis water into hydrogen and oxygen  
.....

**Q.11:**

- 1- chemical water pollution
- 2- A ) arsenic element causes liver cancer  
B ) Lead element damage of brain cells

**Q.12 :**

- 1-  
a) Lithium – sodium – rubidium – cesium  
b) Li - K - Na - Rb - Cs

### **Q.13:**

1- X) : Alkalil metal - (M ) : transition – (D: inert gas)

2- Mention the element which represent :

- a) E
  - b) J -K
  - c) D
  - e) E
- .....

### **Q.14 :**

1- Biological water pollution

2-Bilharizia , typhoid and hepatitis

- 3- A) Prevention of getting rid of sewage and factories wastes in water  
B) Disinfection of the dinking water tanks in a periodical manner  
C) Don't store tap water in empty plastic bottles

## Lesson "3"

### "Main group in modern periodic table"

1-Alkali metals group (group 1A) :

**Location :** 1-It is located on the maximum **left side** of the modern periodic table .

2-It is the **first** group of **s-block** .

حفظ بالترتيب

Group (1)

3	Li	Lithium
11	Na	Sodium
19	K	Potassium
37	Rb	Rubidium
55	Cs	Cesium
87	Fr	Francium

Alkali metals

### General properties of alkali metals :

#### Physical properties:

- 1-all of them are solids at ordinary temperature and they have metallic luster .
- 2-they are good conductors of heat and electricity .
- 3-most of them have low density.

#### Exercise :

**Study the opposite figure which represent the density of alkali metals ,then determine :**

- 1-the alkali metals which has the lowest density and which one has the highest density.
- 2-the elements that float and sink in water with explanation .

#### Answer

- 1- the **lowest** density alkali metals : lithium ( Li ) element .  
- the **highest** density alkali metals : cesium ( Cs ) element
- 2-alkali that float on water surface : **lithium ( Li ) , sodium ( Na ) , potassium ( K )** .

**Explanation :** because their densities are smaller than the density of water( $1\text{gm /cm}_3$ )

-Alkali elements that sink in water : rubidium ( **RB** ) , Cesium ( **Cs** ).

**Explanation:** : because their densities are greater than the density of water( $1\text{gm /cm}_3$ )

#### Chemical properties :

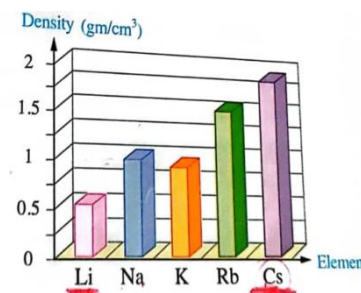
- 1-their outermost energy level contains only one electron .
- 2-they are monovalent elements.
- 3-they are **chemically active** elements.

They are kept under the surface of kerosene or **paraffin oil**

- 4- there are chemically active increases as the atomic number **increases**

#### NB:

Alkali metals are kept under the surface of kerosene (**except lithium** which is kept under the surface of **paraffin oil**).



## GR

### 1-Alkali metals are monovalent elements

Because they tend to lose their valency (outermost) electron during the chemical reaction forming positive ions, each of them carries one positive charge.

### 2- alkali metals kept under the kerosene or paraffin oil.

To prevent their reactions with moist air.

### 3- chemical activity of alkali metals increases as the atomic number increases .

Due to increase in their atomic sizes, so they can lose valency electron easily.

### 4-cesium (cs) is the most active alkali metal in the periodic table .

Because it has the largest atomic size , so it can lose its valency electron easily.

=====

### Reaction of Alkali metals with water

**Conclusion :** Each of sodium and potassium react with water forming **alkali solution** and **hydrogen gas** evolves.

$2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2\uparrow$	$2\text{K} + 2\text{H}_2\text{O} \rightarrow 2\text{KOH} + \text{H}_2\uparrow$
Sodium water      Sodium hydrogen Hydroxide          gas	Potassium water      potassium hydrogen Hydroxide              gas

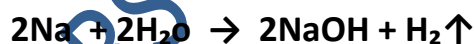
\*the reaction of potassium with water is **stronger than** that of sodium, because potassium is more active than sodium and its size is larger than that of sodium.

**GR:** 1-Elements of group (1A) in the periodic table are called alkali metals (alkaline metals).

Because they react with water forming alkaline solutions.

### 2-sodium fires are not put off with water

Because sodium reacts instantly with water and hydrogen gas evolves which burns with a pop sound by the effect of heat of the reaction .



### 2-Halogens group (group 7A)

**LOCATION :**

\*It is located on the right side of the modern periodic table

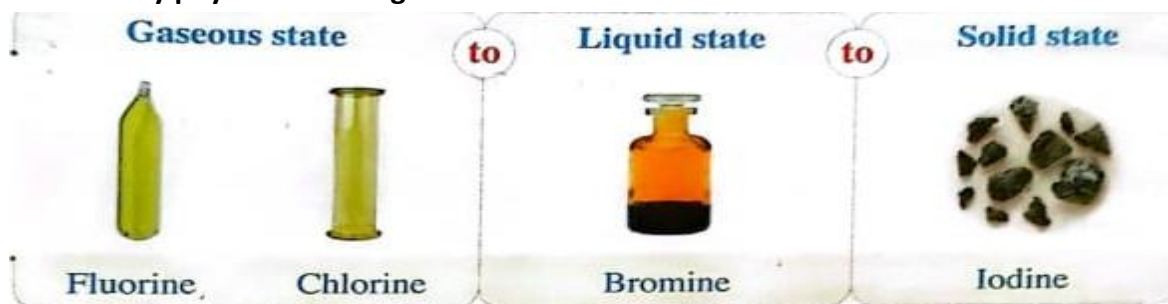
\*it is one of the groups of p-block

Group (17)	
9	F Fluorine
17	Cl Chlorine
35	Br Bromine
53	I Iodine
85	At Astatine
Halogens elements	

**\*General properties of halogens:**

**A) physical properties:** 1- they are bad conductors of heat and electricity .

2- they physical state is graduated from :



**B) Chemical properties :**

1- their outermost energy level contains 7 electrons.

**2- they are monovalent elements GR**

Because they tend to gain one electron only during the chemical reaction forming negative ions each of them carries one negative charge.



Nonmetal "halogen" + electron  $\rightarrow$  negative ion

3- they are chemical active elements , therefore they do not exist individually in nature but they exist in chemical compounds (except Astatine (At) which is prepared artificially)

4- they exist in the form of diatomic molecules (formed of two atoms).

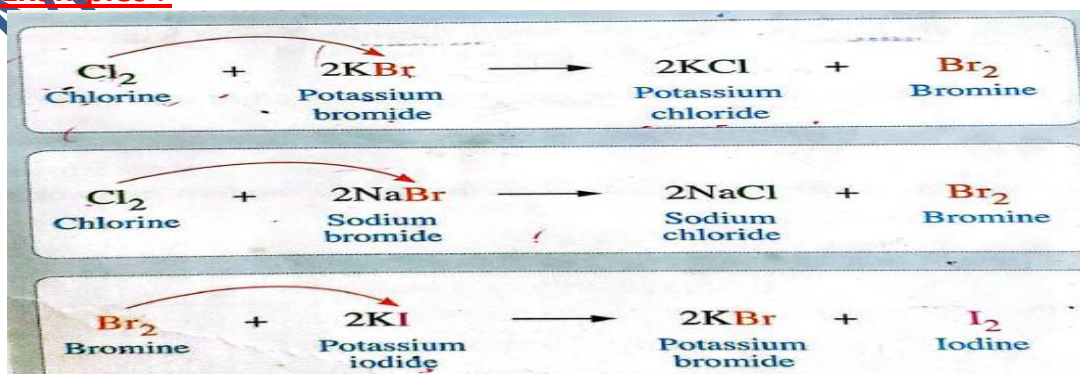
Element	Fluorine	Chlorine	bromine	Iodine
Formula of molecule	$F_2$	$Cl_2$	$Br_2$	$I_2$

5- they react with metals forming salts so, they are called halogens , which mean " salts formations"

$2K + Br_2 \rightarrow 2KBr$
Potassium bromine potassium bromide
$2Na + Cl_2 \rightarrow 2NaCl$
Sodium chlorine sodium chloride

6- each element from halogens replaces the elements below it in their salt solutions .

**Examples :**





**For illustration** : although fluorine is most active halogen

### 3-inert gases group (group 18)

#### Location :

\*it is located on the maximum right side of the modern periodic table .

\*it is last group in p-block.

#### \*General properties properties of inert gases:

1-they are present in gaseous state .

2-their outermost energy level contain 8 electrons , except helium which contain only 2 electrons {Helium has only (K) energy level}

3-their valency equal zero **GR**.

because their outermost energy levels saturated with electrons.

4-they are chemically inactive elements , where they don't react with other elements under normal conditions.

5- they exist in the form of monoatomic molecules (formed of one atom only)

#### Comparison between main groups in the modern periodic table:

P.O.C	Alkali group	Halogens group	Inert gases group
Group number	(1)1A	(17)7A	(18)0
Block which it belongs to	S-block	P-block	
Valency of its elements	Monovalent		Zero

He
Ne
Ar
Kr
Xe
Rn

Inert gases

### Properties of elements and their uses

Uses of their compounds in the modern techniques depend on their properties and types .

The following table shows the uses of some elements .

Element	Its uses
sodium $^{23}\text{Na}_{11}$ Sodium in a liquid state	It is used a liquid state (as it is a good conductor of heat) in transferring heat from inside the nuclear reactor to outside to be used to obtain the vapour energy required to generate electricity .
Cobalt $^{60}\text{Co}_{27}$ Radioactive cobalt 60	It is used in food preservation
Silicon $^{28}\text{Si}_{14}$ Silicon	Silicon slides are used in the manufacture of electronic device such as computer and transistor
Nitrogen $^{14}\text{N}_7$ Liquefied nitrogen	It is used in the preservation of cornea of the eye.

**GR: 1- Cobalt ( $^{60}\text{Co}_{27}$ ) is used in food preservation**

because it radiates(**emits**) gamma rays, which prevent the reproduction of microbial cells without an effect on human.

**2- Silicon slides are used in the manufacture of electronic device such as computer and transistor**

Because it is a semi- conductor which its ability to conduct electricity depends on temperature .

**3- nitrogen(<sup>14</sup>N<sub>7</sub>) is used in the preservation of cornea of the eye.**

Due to the decrease in its boiling point (-196° C)

=====

**GR:**

**1-Alkali metals are monovalent elements .**

Because they tend to lose the valency electron during the chemical reaction .

**2-sodium is kept under the surface of kerosene .**

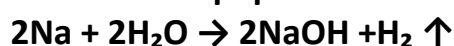
To prevent it from the reaction with moist air as it is an active metal .

**3-lithium (<sup>3</sup> Li ) is the least active metal in group (1A) .**

Because it has the least atomic size in group (1A) .

**4-sodium fires are not put off with water.**

Because sodium reacts instantly with water and hydrogen gas evolves which burns with a pop sound .



**5-Potassium is more active than sodium .**

Because the atomic size of Potassium is larger than that of sodium.

**6-the reaction of the potassium with water is more strongly than that of sodium.**

Because potassium is more active than sodium .

**7-elements of group (7A) are known as halogens .**

Because they react with metals forming salts .  $2\text{K} + \text{Br}_2 \rightarrow 2\text{KBr}$

**8- Halogens are monovalent .**

Because they tend to gain one electron only during the chemical reaction.

**9- halogens exists in the form of diatomic molecules**

**- halogens do not exist in nature in the elementary state .**

Because they are chemically active elements .

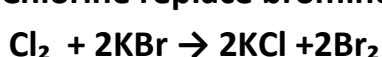
**10-bromine can't replace chlorine in its salt solution .**

Because bromine is less active than chlorine .

**What happened when..?**

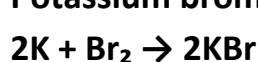
**1-passing chlorine gas in potassium bromide solution .**

Chlorine replace bromine in its solution .



**2- putting a piece of potassium in a beaker containing liquid bromine .**

Potassium bromide salt is formed .



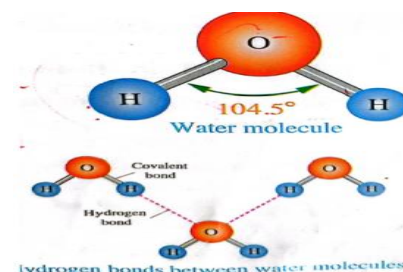
## Lesson (4)

### Water

#### Structure of water

##### Formation of polar water molecule :

\*water molecule is formed of one oxygen atom (O) with two hydrogen atoms (2H) joined together by two single covalent bonds, the angle between them is  $104.5^\circ$



##### Bonds between water molecule : hydrogen bond

GR : Bonds between water molecules originate a types of weak electrostatic attraction known as hydrogen bond .

Due to the higher electronegativity of oxygen compared with hydrogen .

N.B : Bonds between water molecules is **covalent bond** while bonds between water molecules is **hydrogen bond** .

##### hydrogen bond:

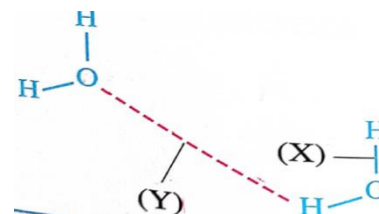
It is type of weak electrostatic attraction that originates between the molecules of some polar compounds .

\* hydrogen bond between water molecule are weaker than covalent bond between the atoms in the same molecule . however bonds are considered to be the most important factors which are responsible for the abnormality of water properties .

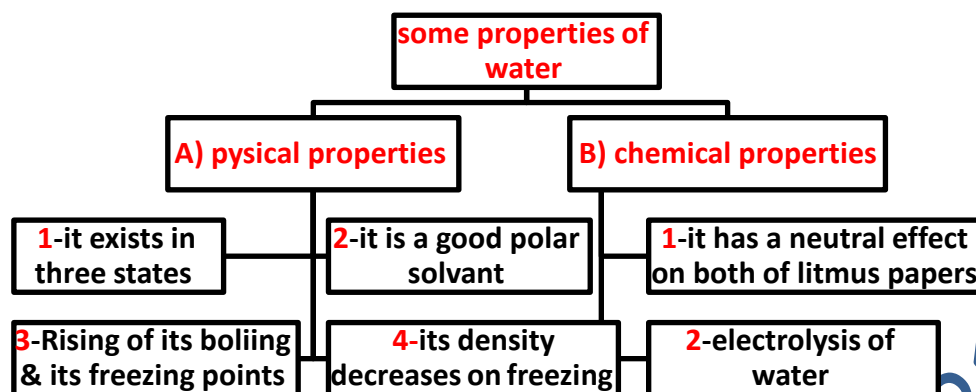
Question: From the opposite figure :

1-what the type of the two bonds (X) and (Y)?

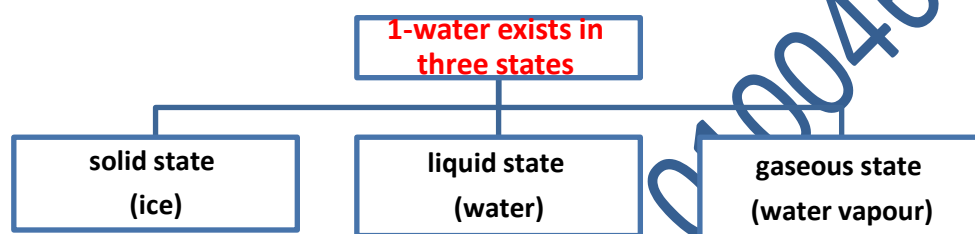
2-which one of them is stronger ?



## Properties of water



### A) physical properties of water :



### 2-water is a good polar solvent :

#### Conclusion:

Water is a good polar solvent for :

**1-** most ionic compounds (such as sodium chloride) {table salt}

**2-** some covalent compounds (such as sugar) , which can form hydrogen bond with water .

\*most covalent compounds as oil cannot dissolve in water as it cannot form hydrogen bonds with water.

#### GR: 1-Dissolving of table salt in water.

Because water is a good polar solvent for most ionic compounds (as table salt).

#### 2- Dissolving of sugar in water although it is among covalent compounds.

Because sugar molecules form hydrogen bonds with water molecules.

#### 3-Oil doesn't dissolve in water.

Because it is a covalent compound which cannot form hydrogen bonds with water.

=====

### 3-Rising of its boiling & its freezing points:

the boiling point	the freezing point
It was supposed that	
the boiling point of water is less than (100°C)	the freezing point of water is less than 0°C
but in the normal atmospheric pressure	
Pure water boils at 100°C.	Pure water freezes at 0°C
due to the presence of hydrogen bonds between its molecules.	

### 4-water density decreases on freezing

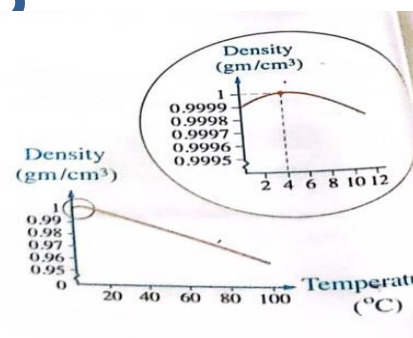
**GR :** Water is not like other matters, where its density in solid state (ice) is lower than its density in liquid state (water)

because when the a temperature of water becomes less than 4°C , water molecules are collected together by hydrogen bonds forming large-sized hexagonal ice crystals with many spaces between them , so its volume increases and thus its density decreases.

**NB:** The opposite figure shows the change of water density by changing its temperature , where :

-The **highest** value of density of pure water at 4°C

-The **lowest** value of density of pure water at 0°C



**GR: 1-** ice floats on the water surface

Because the density of ice is less than the density of water

**2-although water of oceans freezes at polar zones, the aquatic creatures are still alive .**

Due to formation of a layer of ice on the surface of liquid water protects the deep water from freezing which preserves the life of the marine organisms in it.

**3-on putting a glass bottle completely filled with water in a freezer , it breaks (explodes ) .**

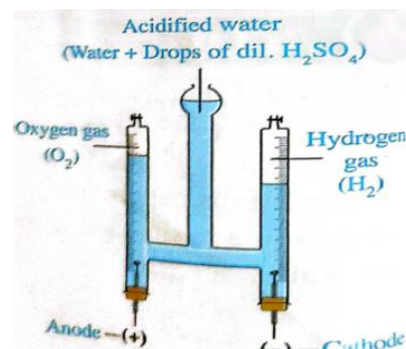
Because when water freezes , its volume increase .

=====

## Chemical properties of water :

1-water has a **natural effect** on both of litmus papers . [ **blue and red** ]

متعادل التأثير علي ورقة عباد الشمس الحمراء نظل حمراء والزرقاء نظل زرقاء



**GR:** Pure water doesn't affect blue and red litmus papers .

Because pure water has a natural effect on both of litmus papers .

## 2-Electrolysis of water

\***Hydrogen gas** evolves at the **cathode** .

\***Oxygen gas** evolves at the **anode** .

=====

**N.B :**1-Hydrogen gas  $H_2$  [burns with pop sound] . يشعل بفرقعة

2- **Oxygen gas**  $O_2$  [increase the glow of glowing splint] . يزيد من اشتعال الشظية

3-the **volume** of  $H_2$  is twice the volume of  $O_2$  .  $H_2 = 2 \times$  volume of hydrogen ( at cathode) =  $2 \times$  volume of oxygen (at anode)

Ratio: 2 : 1

النسبة  $H_2 : O_2$



## Used of Hofmann's voltammeter :

Used for the electrolysis of acidified water into hydrogen( at cathode) and oxygen (at anode )

**GR:**1-Adding few drops of dilute sulphuric acid (or sodium carbonate ) to pure water during its electrolysis by Hofmann's voltammeter.

To make water conduct electricity , where the pure water is a bad conductor of electricity.

2-the glowing of splint increases by approaching it to the anode of Hofmann's voltammeter during electrolysis of acidified water .

Because oxygen gas evolves at the anode that increases the glowing of splint.

**Exercise :** On the electrolysis of a certain volume of acidified water by dilute sulphuric acid , the volume of evolved oxygen gas was  $2 \text{ cm}^3$  . what is the volume of evolved hydrogen gas ?

**Answer :** \*the volume of hydrogen gas =  $2 \times$  volume of oxygen gas .

\* the volume of hydrogen gas =  $2 \times 2 = 4 \text{ cm}^3$  .



**Exercise :** On the electrolysis of a certain volume of water , the volume of the gas which burns with a pop sound on approaching a glowing splint to it is  $6\text{ cm}^3$  , what is the volume of the other gas produced from the electrolysis ?

**Answer:** \*the gas which burns with a pop sound is hydrogen.

The volume of oxygen gas =  $\frac{\text{the volume of hydrogen gas}}{2} = \frac{6}{2} = 3\text{ cm}^3$

**Water pollution :** it is the addition of any substance to the water which causes continuous gradual change in water properties affecting the health and the life of living creatures .

### Water pollutants and their harms

Environmental pollutants are divided generally into two kinds, which are:

	Natural pollutants	Artificial pollutants
<b>Sources</b>	Natural phenomena	Different human activities
<b>examples</b>	<ul style="list-style-type: none"> <li>*Lightning accompanied by thunder storms</li> <li>*death of living organisms</li> <li>*volcanic eruptions.</li> </ul>	<ul style="list-style-type: none"> <li>*the overuse of chemical insecticides and fertilizers.</li> <li>*throwing sewage , factories wastes and leakage of petroleum oil in the seas and rivers.</li> <li>*burning coal and oil , which leads to the formation of acidic rains and smog.</li> </ul>

### Types of water pollution :

Types of water pollution	Causes (origins)	Harms (damages )
① Biological pollution	Mixing animals and human wastes with water	The infection with many diseases such as : bilharzia, Typhoid and hepatitis .
② Chemical pollution	Discharging factories wastes and sewage in seas ,rivers and canals .	The increase in some elements concentration causing great harms as : <b>1- the death of brain calls:</b> When eating continuously fish whose bodies contain high concentration of lead <b>2-blindness :</b>

		When drinking continuously from water high concentration of mercury . <b>3-cancer :</b> When drinking continuously from water containing arsenic .
③ <b>Thermal pollution</b>	Rising of temperature of some marine zones which use water for cooling the nuclear reactors .	Destroy the marine creatures found in these zones due to the separation of the dissolved oxygen in water
④ <b>Radiant pollution</b>	Dumping the atomic wastes in oceans and seas. Leaking of radioactive materials from nuclear reactors .	<u><b>For illustration :</b></u> Increase the infection rates of cancer .

**Note:** The nuclear reactors cause both thermal water pollution and radiant water pollution .

**Protection of water from pollution :**

There are many behaviors that must be taken in consideration to protect water from

**1-**prevention of getting rid of sewage , wastes of factories and dead animals in rivers or canals .

**2-**Disinfection of the drinking water tanks which are found on the roofs of buildings in a periodical manner .

**3-**Don't store the tap water in empty plastic bottle because plastic reacts with chlorine gas (which is in the infection rates of cancer.

**4-** spreading environmental awareness among people to protect water pollution .

**5-**Developing the station of water purification and doing a periodical analysis to determine the rate of water validity for drinking .

=====

**What happens when.....?**

**1-putting a glass bottle filled with water in the freezer for a long time .**  
It will be broken .

**2-decrease in water temperature less than 4°C .**

The water molecules are collected together by hydrogen bonds forming large-sized hexagonal ice crystals with many spaces between them so, its volume increases and thus its density decreases.

**3-water molecules are linked together by hydrogen bonds**

The abnormality of water properties such as rising of its boiling and freezing points and decreasing its density on freezing .

**4-passing of electric current through Hofmann's voltmeter containing acidified water.**

The acidified water decomposes into hydrogen gas evolves at the cathode and oxygen gas evolves at the anode . the ratio between the produced hydrogen gas and oxygen gas is about (2 : 1) by volume respectively.

**5-pollution of water with animal and human wastes .**

The infection by many diseases such as bilharzia , typhoid and hepatitis.

**6-storing water in plastic bottles of mineral water.**

Plastic reacts with chlorine gas (which is used as water disinfectant) leading to the increases in the infection rates by cancer.

**7-throwing synthetic cleaning substance in water .**

This leads to increases the concentration of some elements causing great harms.

=====

## Lesson three

### The main groups in the modern periodic table

#### 1-Alkali metals group (1A)

- They are located on the left side of the modern periodic table.
- They are the first group of s-block.

#### **General properties of alkali metal:**

Physical properties	Chemical properties
1-All of them are solids at ordinary temperature	1-outermost energy level contains only one electron
2-have metallic luster	2-they are monovalent elements
3-they are good conductors of heat and electricity.	3-they are chemically active (kept under surface of kerosene or petrol oil)
4-most of them have low density.	4- Their chemical activity increases as the atomic size increases

#### 2-Halogens group (7A)

- They are located on the right side of the Modern periodic table
- They are elements of group (17) in p-block

#### General properties:

##### **1-physical properties**

- 1-Bad conductors of heat and electricity
- 2-Their physical state is graduated from (gas like fluorine and chlorine) (liquid like bromine) (solid like iodine)

##### **2-chemical properties**

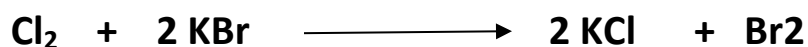
- 1-outermost energy level contain 7 electrons.
- 2-They are mono-valent elements.
- 3-They are active elements so they don't exist individually in nature.

4- exist in form of diatomic  $F_2$ ,  $Cl_2$

5- They react with metals forming salts, so they are called halogens which means "Forming salts".



6-. Each element replaces the element below in its salt solution.



### **3-Inert gases group (18)**

- It is located on the maximum right side of the periodic table.
- last group in p-block

#### **General properties of inert gases:**

- 1-they are present in gaseous state.
- 2-They contain 8 electrons in the outermost energy level except helium which contains 2 electrons.
- 3-Their valency equal zero.
- 4-They are chemically inactive.
- 5-They exist in the form of monoatomic.

#### **Properties of elements and their uses:**

##### **1) Sodium ( $_{11}Na$ ):**

- It is used in liquid state in transferring heat from inside the nuclear reactor to outside.

##### **2) Cobalt ( $_{27}Co^{60}$ ):**

- It is used in food preservation.

##### **3) Silicon ( $_{14}Si$ ):**

- It is used in the manufacture of the electronic devices.

##### **4) Liquified nitrogen:**

- It is used in preservation of cornea of eye.

## Questions (3)

### 1- Write the scientific term

1. The most active metal. (.....)
2. A gas that is used in cornea preservation. (.....)
3. Non- metal elements do not exist in nature in elementary state (.....)

### 2- Complete the following

1. ....is used to transfer the energy from inside the reactor to outside
2. The chemical activity of alkali metal .....as the .....increases
3. Lithium and sodium .....on the surface of water as their densities are .....than that of water .
4. Alkaline earth metals react with water to produce .....gas.
5. Metal oxides are called .....while nonmetals oxides are called.....
6. Valency of group 2 A is .....while group 7 A is .....

### 2- Give reason for :

- 1- Elements of group (1A) are known as alkali metals  
.....
- 2- Sodium and potassium are kept under the kerosene surface.  
.....
- 3- Group (7A) elements are called Halogens.  
.....
- 4- Rubidium and cesium elements sink in water.  
.....



**4) What is the importance of:**

1. Silicon

.....

2. Sodium

.....

3. Liquefied Nitrogen

.....

## Lesson four

### Water

**Hydrogen bond:** it is a type of weak electrostatic attraction that originates between the molecules of some polar compound

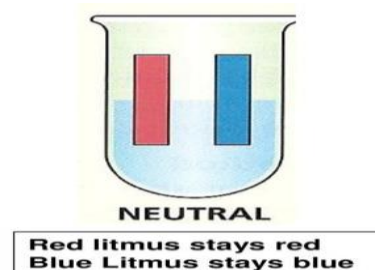
#### 1-Properties of water:

##### A) Physical properties:

- 1) Water exists in three states in the normal temperature.
- 2) Water is good polar solvent.
- 3) Pure water boils at  $100^{\circ}\text{C}$  and freezes at  $0^{\circ}\text{C}$ .
- 4) Water density decreases on freezing:

##### B) Chemical properties:

- 1) water has a neutral effect on litmus paper.

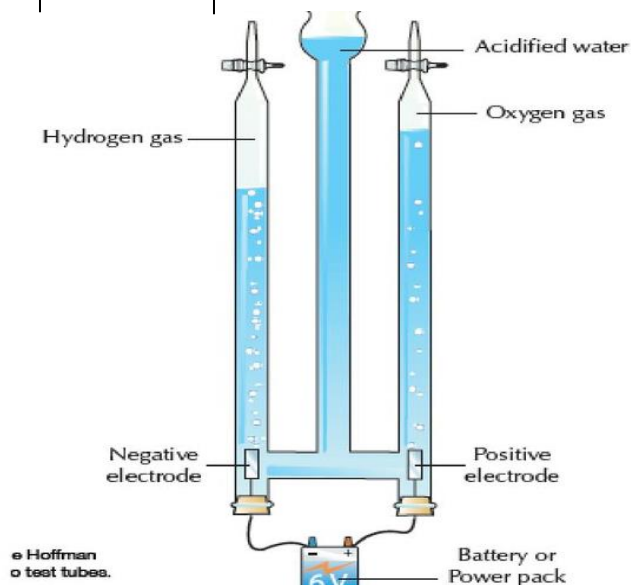


##### 2)Electrolysis of water

Hofmann's voltameter is used for the electrolysis of acidified water



Volume of hydrogen gas at cathode=  
**2x volume of oxygen gas at anode**



**Water pollution:** It is the addition of any substance to the water which causes continuous gradual change in water properties affecting the health and the life of living creatures.

**Water pollutants and their harms:**

1- Natural water pollutants: from

- \*Volcanic eruptions.

- \*Death of living creatures.

- \*Lightning accompanying thunder storms

2- Artificial water pollutants:

- \*overuse of chemical insecticides

- \*Burning of coal and oil

**Types of water pollutants**

- Biological pollution

- Chemical pollution

- Thermal pollution

- Radiant pollution

**Protection of water from pollution:**

1. Preventing of getting rid of sewage, wastes of factories and dead animals in rivers and canals.
2. Developing the stations of water purification.
3. Disinfection of drinking water tanks in a periodical manner.
4. Don't store water in empty plastic bottles.

## Questions (4)

### I-Complete

1. water molecules consist of .....
2. The density of water in .....state is lower than its density in .....state
3. The hydrogen bond is .....
4. Pure water boils at ..... and freezes at .....
5. .... is the positive pole of Hoffman's voltmeter while ..... is the negative pole.
6. Mixing of animal and human wastes with water causes..... water pollutants while Dumping atomic wastes in ocean causes ..... water pollutants.

### 2) Write the scientific term:

1. A kind of water pollution which results from discharging of factories wastes (.....)
2. The bond which links the molecules of water (.....)
3. it is a type of weak electrostatic attraction that originates between the molecules of some polar compound (.....)

### 3) Give reason for :

1-Ice floats on water surface.

.....

2-Water is important liquid in distinguishing of fires

.....

3-Dissolving of sugar in water although it is from covalent compounds.

.....

4-The closed glass bottle filled with water is broken when it is put in freezer.

.....

5-Adding drops of dilute acid to water during its electrolysis.

.....

**4) What's meant by :**

1. Hydrogen bond:

.....

2. Water pollution:

.....

3. Pollutants:

.....

## Lesson (3)

### “Main Groups in the Modern Periodic Table”

**From the main groups in the modern periodic table:**

#### **1. Alkali metals group (Group 1A) :**

- Group 1A lies in the maximum left of the periodic table, their metals are named alkali metals because they react with water forming alkali solutions.



#### **General properties of alkali metals :**

- They are mono-valent elements because their outermost shells contain (1) electron.
- They tend to lose their valency electron forming positive ions that carries one positive charge.
- They are chemically active elements so they are kept under kerosene or paraffin to prevent their reaction with the moist air.
- Their chemical activity increases by the increase of atomic size.  
“Cesium (Cs) is considered as the most active metal in general.”
- They are good conductors of heat and electricity.
- Most of them have low density.

#### **2. Halogens group ( 7A)**

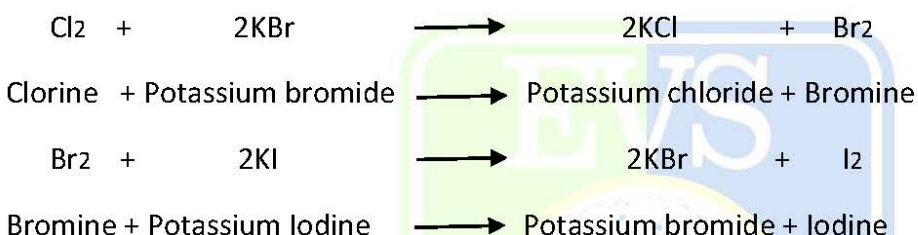
- Group (7A) lies on the right side of the periodic table, it is one of (p) block groups.
- They are salts formations, because they react with metals forming salts.



Potassium + Bromine  $\longrightarrow$  Potassium bromide

## General properties of halogen elements:

- They are mono-valent nonmetals.
- They exist as diatomic molecules  $F_2$  ,  $Cl_2$  , .....etc
- They are chemically active elements, so they do not exist individually in nature but they exist in chemical compounds, except astatine which is prepared artificially.
- Each element in the group replaces the element below it in their solutions.



- The physical state is graduated from the gaseous state (Fluorine, Chlorine) to the liquid state (Bromine) to solid state (Iodine).

## 3. Inert gases (group 18)

- It is the last group in p-block

### General properties of inert gases:

- They present in gaseous state, they are chemically inactive elements as their outermost energy level saturated by 8 electrons except He which contains 2 electrons.

## - The properties of elements and their uses

- 1-**Sodium** is used in liquid state in transferring heat from inside the nuclear reactor to outside.
- 2-**Silicon** slides are used in the manufacture of computers because they are semiconductors.
- 3-**Liquidified nitrogen** is used in preservation of the cornea of the eye because it has a low boiling point.
- 4-**The radioactive cobalt 60** is used in food preservation because gamma rays which come out from it prevent the reproduction of microbial cells without an effect on human.

• **Choose the correct answer :**

- 1- ..... is considered from halogens.
  - a- sodium
  - b- chlorine
  - c- Helium
  - d- calcium.
- 2- .....form positively charged ions when they enter any chemical reaction.
  - a. inert gases
  - b. alkali metals
  - c. Halogens
  - d. nonmetals.
- 3- ..... used as semi-conductors in computers.
  - a- silicon slides
  - b- cobalt 60
  - c- liquefied nitrogen
  - d- sodium

• **Put (✓) or (x) in front of each element:**

- 1- The alkaline metals are good conductors of heat and electricity. (.....)
- 2- Halogens are monovalent elements. (.....)
- 3- Iron and copper are inert gases elements . (.....)
- 4- Chlorine is found in a solid state. (.....)
- 5- Liquefied Nitrogen is used in preservation of cornea. (.....)



• **Complete the following:**

- 1 -elements of group (1A) are named as.....and they are from.....block elements.
- 2-the valence of element in group (7A) is..... As they tend to .....electron.
- 2- Sodium is kept under the surface of ..... to prevent it from reaction with .....
- 3- The element of group (17) are called....., while the element of group (18) are called.....
- 4-  $2\text{Na} + \text{Cl}_2 \longrightarrow$  .....

• **Write the scientific term :**

- 1- The halogen which exist in a solid state. (.....)
- 2- An element used to preserve tissue as eye cornea. (.....)
- 3- A liquid metal acts as a heat conductor in nuclear reactors for generating electricity. (.....)

• **Give reason for:**

- Sodium fires don't put off with water.  
.....
- Elements of group (1A) are known as alkali metals.  
.....
- Halogens do not exist in the elementary state.  
.....

• **Mention some properties for halogens.**

- .....
- .....
- .....
- .....

• **Write the balanced chemical equations for the following :**

1- Reaction of sodium with water

.....

2- Reaction of chlorine gas with potassium bromide solution

.....

3- Reaction of bromine with potassium iodide

.....

4- Reaction of chlorine with potassium bromide.

.....

• **Compare between:**

**Element of group (1A) and group (7A):** Related to (name-valency-kind of formed ion)

	Element of group (1A)	Element of group (7A)
name		
valency		
formed ion		
Examples		

## Science practicals



### **Activity 3 “Discovering the chemical properties of alkali”**

#### Substances and Tools:

A piece of sodium	A piece of potassium	Basin	Water
-------------------	----------------------	-------	-------

**Step 1:** Take out a piece of Sodium from the kerosene in which Sodium is kept.

**Step 1:** Put the sodium carefully in the water basin.

**Step 1:** repeat the previous steps with Potassium.

#### Observation:

Why Na and K are kept under kerosene?

.....

.....

Which is stronger in reaction with water Na or K ?

.....

.....

Write your conclusion.

.....

.....





## **Lesson 4**

### **“Water”**

#### **Structure of water molecule:**

- Combination of one oxygen atom with two hydrogen atoms by two single covalent bonds, its angle is  $104.5^\circ$
- Water molecules linked together by hydrogen bond as oxygen has higher electronegativity than hydrogen.

**Hydrogen bond:** it's a weak electrostatic attraction force between the molecules of polar compounds.

#### **Properties of water: A- Physical properties:**

- 1- **State:** solid (ice) – liquid (water) – gaseous (water vapour).
- 2- **Good polar solvent:**
  - Dissolve most ionic compounds as table salt (sodium chloride).
  - Dissolve some covalent compounds as sugar as it forms hydrogen bonds with it.
  - Can't dissolve some covalent compounds as oil as they can't form hydrogen bonds with water.
- 3- Pure water boils at  $100^\circ\text{C}$  and freezes at  $0^\circ\text{C}$  , Due to presence of hydrogen bonds between molecules.
- 4- Density decreases on freezing as when the temperature of water decreases than  $4^\circ\text{C}$ , as water molecules are collected together by hydrogen bonds forming ice crystals which have hexagonal shape, large volume and large number of spaces between them.
  - Ice crystals float on the water surface and this helps in the preservation of the life of aquatic creatures.

**B- Chemical properties: 1-** Water has a neutral effect on litmus paper.

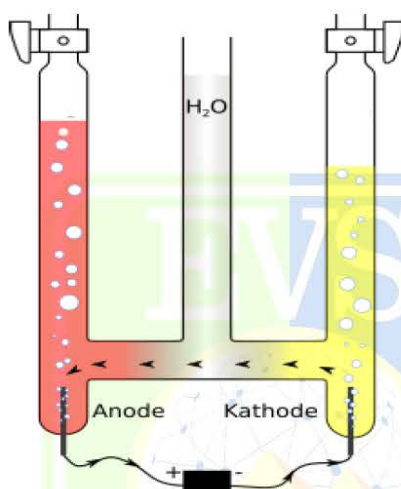
**2- Water electrolysis:** acidified water decomposes by electricity into:

- Oxygen: evolves at Anode, as oxygen ions are negatively charged which makes more glowing.
- Hydrogen: at Cathode, as hydrogen ions are positively charged and burns with blue flame & pop sound.
- The volume of hydrogen gas evolved is greater than that of oxygen (ratio between them is 2:1).
- Hofmann's voltammeter: used for the electrolysis of acidified water.

**- Note:** We add drops of dilute sulphuric acid to water during electrolysis as pure water is a bad conductor of electricity.

## Activity 4 “Electrolysis of water”

- Write the name of the following apparatus that is used in Electrolysis of water process.



### Observation:

- 1- What is the ratio between the volume of gas evolved over cathode and the gas evolved over anode?

.....

- 2- Write the names of these two gases, how do you know?

.....

- 3- Why we add a few drops of dilute sulphuric acid to water during its electrolysis by this apparatus?

.....

- 4- Write your conclusion, support your answer with equations

.....

- Calculate the volume of the gas evolves at the positive pole if the volume of the gasat the negative pole is 20  $cm^3$ ?

.....

• **Choose the correct answer:**

- 1- The volume of hydrogen gas evolving from water electrolysis equals.....the volume of oxygen gas.
  - a- that of
  - b- double
  - c- half
  - d- four times
- 2- The type of bond between water molecules is .....bond.
  - a- metallic
  - b- ionic
  - c- hydrogen
  - d- covalent.
- 3- The density of pure water in solid state is.....
  - a- less than its density in liquid state.
  - b- equal to its density in liquid state.
  - c- equal to its density in gaseous state.
  - d- greater than its density in liquid state.
- 4- In the electrolysis of acidified water by using Hofmann's Voltammeter, the volume of hydrogen gas that evolves is (40cm<sup>3</sup>) , so the volume of oxygen gas that evolves is .....cm<sup>3</sup>
  - a- 80
  - b- 40
  - c- 20
  - d- 10
- 5- Increasing the concentration of .....in drinking water causes blindness.
  - a- lead
  - b- arsenic
  - c- mercury
  - d- chlorine

• **Put (✓) or (x) in front of each element:**

1-Hofmann's Voltammeter is used for water ionization. (.....)

2- The pure water has a neutral effect on the litmus paper. (.....)

3- Water and ammonia are from polar compounds. (.....)

• **Complete the following :**

1- There are..... bond in water molecule.

2- The bond between hydrogen atom and oxygen atom in water molecule is .....bond while bonds among water molecules are ..... bonds.

3- Water can dissolve .....compounds that can form .....bonds with water.

4- Water is a good polar .....as it has the ability to dissolve most..... Compound.

5- Increasing the concentration of mercury in drinking water causes .....,while ..... increases the infection rate by liver cancer.

• **Give reason for:**

1- Water is a good polar solvent.

.....

2- Although sugar is a covalent compound, it dissolve in water.

.....

• **What happen when?**

1-Storing water in plastic water.

.....

2-drinking water rich in mercury.

.....



# Worksheet 6 lesson 3

## [1] - Complete the following:

- 1 - Elements of group 1 are called -----and they form----- block.
- 2 - Sodium and Potassium are kept under the surface of -----.  
To prevent them from the reaction with -----.
- 3 - ----- and -----elements are examples of alkaline earth metals.
- 4 - The chemical activity of the elements of group 2 is ----- than that of the alkali metals.
- 5 - All alkali metals are -----Conductors of heat and electricity.
- 6 -  $2\text{Na} + \text{-----} \longrightarrow 2\text{NaOH} + \text{-----} \uparrow$

## [2] Give reasons:

- 1 - Chlorine is used in the manufacture of the corrector's substances.  
-----
- 2 - Sodium fires don't put off with water.  
-----
3. Elements of group(1) are known as alkali metals.  
-----
4. Liquified nitrogen is used in preservation of cornea of the eye.  
-----



**[3] Choose the correct answer:**

1. -----is considered from halogen.

( Sodium - Chlorine - Helium - Calcium )

2. -----in its salt solution.

( Chlorine replaces bromine - bromine replaces fluorine - iodine replaces chlorine - iodine replaces fluorine)

**[4] Mention one use for each of the following elements:**

1. Liquid sodium:

-----

2. Silicon:

-----

3. Cobalt 60:

-----

**[ 5] From the figure; Mention the symbols which indicate the following**

																	N
A													I	K		L	
	C											H					O
B				D			E		F		G		J			M	

1. Inert gases. \_\_\_\_\_

2. Alkali metals. \_\_\_\_\_

3. Halogens. \_\_\_\_\_

4. Alkaline earth metals. \_\_\_\_\_

5. The most active metal. \_\_\_\_\_

6. The most active non metal. \_\_\_\_\_

**[6] Write the scientific term:**

- 1 - Monovalent elements which exist in p-block in the modern periodic table. (-----)
- 2 - The halogen which exists in a liquid state. (-----)
- 3 - The radioactive elements which is used in food preservation. (-----)
- 4 - The metalloids which is used in the manufacture of electronics. (-----)
- 5 - The boiling point of liquified nitrogen. (-----)

**[7] - Write the chemical equation that illustrate the following:**

- 1 - Reaction of potassium with bromine.

-----.

- 2 - Passing chlorine gas in potassium bromide solution

-----.

# Worksheet 7 Lesson 4

## Q1. Complete:

1. Water molecule consists of the combination of one ----- atom with two ----- atoms to form two single ----- bond.
2. The abnormality of the physical properties of water is due to the presence of -----bond.
3.  $2 \text{H}_2\text{O} \xrightarrow{\text{electrolysis}}$  ----- + -----
4. From the water pollutants are:

-----, -----,  
-----

## Q2 Give reasons:

1. The presence of hydrogen bond between water molecules.  
-----
2. Pure water doesn't affect litmus paper.  
-----
3. Although sugar is a covalent compound, it dissolves in water.  
-----
4. The boiling point of water is high.  
-----

## Q3 Choose from column B the suitable answer from A

A	B
1. Death of brain cells	a. Lead
2. Cancer of liver	b. Sodium
3. Blindness	c. Mercury
	d. Arsenic

**Q4. What are the results of:**

**1. Water is polluted with the wastes of man and animals.**

-----  
-----

**2. Storing water in plastic bottles of mineral water.**

-----  
-----

**3. Drainage of factories wastes in rivers& seas.**

-----  
-----

**4. Using rivers& seas water for cooling the nuclear reactor.**

-----  
-----

**Q5 A. Write the chemical equation which illustrates the electrolysis of water.**

-----  
-----

**B. If the volume of evolved oxygen gas at the anode was 2 cm<sup>3</sup>, what is the volume of hydrogen gas evolved at the cathode.**

-----

**c. Mention the name of the apparatus used in the electrolysis of water.**

-----  
-----

### 3 - Lesson Three :

---

1 - Elements of group (18) are known as.....

- a. alkali metals
- b. halogens
- c. noble gases
- d. no correct answer

2 - Hydrogen element belongs to group.....

- a. 1A
- b. 2A
- c. 6A
- d. 7A

3 - Elements of group (1A) are known as.....

- a. alkali metals
- b. halogens
- c. noble gases
- d. no correct answer

4 - Alkali metals are considered from.....block groups

- a. s
- b. p
- c. d
- d. f

5 - .....is (are) from alkali metals

- a. Sodium
- b. Magnesium
- c. Rubidium
- d. (a) and (c)

6 - Which of the following elements is an alkali metal which lies in period 3?...

- a.  ${}^3\text{Li}$
- b.  ${}^{12}\text{Mg}$
- c.  ${}^{11}\text{Na}$
- d.  ${}^{19}\text{K}$

7 - Most of alkali metals have.....density

- a. high
- b. low
- c. medium
- d. moderate

8 – All these alkali metals float on water surface except.....

- a. Li                                  b. Na                                  c. K                                  d. Cs

9 – At the ordinary temperature, all alkali metals are found in.....state

- a. solid                                  b. liquid                                  c. gaseous                                  d. (a) and (b)

10 – The outermost energy level of any alkali metal contains.....electron(s)

- a. 1                                  b. 3                                  c. 5                                  d. 7

11 – The valency of alkali metals is.....

- a. monovalent                                  b. divalent                                  c. trivalent                                  d. (a) and (c)

12 – All these elements are monovalent except.....

- a.  $_{11}\text{Na}$                                   b.  $_{19}\text{K}$                                   c.  $_{20}\text{Ca}$                                   d.  $_{3}\text{Li}$

13 – Elements which have atomic numbers.....are called alkali metals

- a. 2,8,16                                  b. 2,10,18                                  c. 3,11,19                                  d. 4,12,20

14 - .....form positive ions during the chemical reactions

- a. Nobel gases                                  c. Halogens  
b. Nonmetals                                  d. Alkali metals

15 - .....are kept under the surface of kerosene in the lab

- a. Alkali metals                                  c. Inert gases  
b. Halogens                                  d. Alkaline earth metals

16 – Sodium and potassium are kept under the surface of.....

- a. water                                  c. alcohol  
b. kerosene                                  d. benzene

17 – The metallic property of alkali metals increases by increasing their.....

- a. electronegativity                                  c. valency  
b. atomic size                                  d. all are correct



18 - .....element has higher chemical reactivity

- a. Sodium                      b. Potassium                      c. Lithium                      d. Cesium

19 - The strongest (most active) metal lies in group.....

- a. 7A                      b. 1B                      c. 1A                      d. 2A

20 - The most active metal in group (1A) is.....

- a. Na                      b. Cs                      c. K                      d. Li

21 - Elements of group (1A) are dissolved in water forming.....solutions

- a. acidic                      b. basic                      c. neutral                      d. red

22 - The gas evolved on reacting alkali metal with water is.....

- a. oxygen                      b. nitrogen                      c. hydrogen                      d. helium

23 - .....reacts with water more strongly than sodium

- a. Potassium                      c. Cesium  
b. Rubidium                      d. All are correct

24 - All the following are from the properties of alkali metals except they.....

- a. have low densities                      c. conduct heat and electricity  
b. are active elements                      d. are divalent elements

25 - Alkali metals have the following properties except.....

- a. they have low density                      c. they conduct electricity  
b. they conduct heat                      d. they don't react with water

26 - Rubidium (Rb) element lies in group (1A) and period....in the periodic table

- a. 2                      b. 3                      c. 4                      d. 5

27 - Elements of group (7A) are known as.....

- a. inert gases                      c. alkali metals  
b. halogens                      d. alkaline earth metals

28 – Halogens are considered from.....block groups

- a. s                                      b. p                                      c. d                                      d. f

29 - .....is considered from halogens

- a. Na                                      b. Cl                                      c. He                                      d. Ca

30 - .....is (are) from the halogens that exist(s) in a gaseous state

- a. Bromine                              b. Chlorine                              c. Fluorine                              d. (b) and (c)

31 – The halogen which exists in a liquid state is.....

- a. bromine                              b. iodine                                      c. fluorine                                      d. chlorine

32 – The halogen which is found in a solid state is.....

- a. bromine                              b. iodine                                      c. fluorine                                      d. chlorine

33 – All of these halogens exist in a gaseous state except.....

- a. iodine                                      b. fluorine                                      c. chlorine                                      d. (b) and (c)

34 – Halogens are.....conductors of heat and electricity

- a. good                                      b. bad                                      c. moderate                                      d. all of them

35 – The outermost energy level of any halogen contains.....electron(s)

- a. 1                                      b. 3                                      c. 6                                      d. 7

36 – The valency of halogens is.....

- a. tetravalent                              b. divalent                                      c. monovalent                                      d. (a) or (b)

37 - .....form negative ions during the chemical reactions

- a. inert gases                                      c. alkali metals  
b. halogens                                      d. alkaline earth metals

38 – The molecule of halogens is composed of.....atom(s)

- a. 1                                      b. 2                                      c. 3                                      d. 4



39 – Halogens don't found in an elementary state except.....which is prepared artificially

- a. oxygen                      b. chlorine                      c. astatine                      d. iodine

40 – The halogen that can be prepared artificially is.....

- a. Cl                      b. I                      c. At                      d. Br

41 – The most active element in group (7A) is.....

- a. F                      b. Cl                      c. I                      d. At

42 - .....in its salt solution

- a. Chlorine replaces bromine                      c. Iodine replaces chlorine  
b. Bromine replaces fluorine                      d. Iodine replaces fluorine

43 – All of these elements can replace bromine in its salt solutions except.....

- a. fluorine                      b. chlorine                      c. iodine                      d. (a) and (b)

44 – Bromine is obtained when chlorine reacts with.....solutions

- a. sodium bromide                      c. sodium iodide  
b. potassium bromide                      d. (a) or (b)

45 – Liquid sodium is used in.....

- a. nuclear reactors                      c. fridges  
b. computers                      d. sterilization

46 – The element which emits gamma rays is.....

- a.  $^{60}\text{Co}$                       b.  $^{23}\text{Na}$                       c.  $^{14}\text{N}$                       d.  $^{35}\text{Cl}$

47 - .....rays are used sterilizing food

- a. Alpha                      b. Beta                      c. Gamma                      d. Laser

48 – The semi-metal (metalloid) that is used in the manufacture of transistor is....

- a. S                      c. Na  
b. Si                      d. K

49 – Cornea is preserved under the surface of.....

- a. nitrogen gas
- b. liquid paraffin
- c. liquefied nitrogen
- d. helium gas

50 – The boiling point of liquefied nitrogen is.....

- a.  $0^{\circ}\text{C}$
- b.  $194^{\circ}\text{C}$
- c.  $-96^{\circ}\text{C}$
- d.  $-196^{\circ}\text{C}$

51 – The valency of noble gases is.....

- a. monovalent
- b. divalent
- c. trivalent
- d. zero

#### 4 – Lesson Four :

---

1 – Water has several uses in.....

- a. agricultural field
- b. industrial field
- c. personal field
- d. all the them

2 – Water molecule is composed of.....

- a. one oxygen atom and one hydrogen atom
- b. two oxygen atom and one hydrogen atom
- c. one oxygen atom and two hydrogen atoms
- d. two oxygen atoms and two hydrogen atoms

3 – In water molecule, oxygen atom is linked with two hydrogen atoms by two...

- a. ionic
- b. single covalent
- c. double covalent
- d. hydrogen

4 – In water molecule, the angle between the two hydrogen atoms is.....

- a.  $64^{\circ}$
- b.  $104.5^{\circ}$
- c.  $104^{\circ}$
- d.  $140.5^{\circ}$

5 – The covalent bond in a molecule of water is (are).....bonds(s)

- a. one double
- b. one triple
- c. two single
- d. two double

6 – The electronegativity of oxygen is.....than that of hydrogen

- a. equal to
- b. higher than
- c. less than
- d. (a) and (b)

7 – There are.....bonds among the water molecules

- a. ionic
- b. covalent
- c. hydrogen
- d. (b) and (c)

8 - .....is a weak electrostatic attraction force that arises between the molecules of polar compounds as water and ammonia

- a. Hydrogen bond
- b. Covalent bond
- c. Ionic bond
- d. (a) and (b)

9 – Hydrogen bond is.....than covalent bond

- a. weaker
- b. stronger
- c. lighter
- d. (a) and (c)

10 - .....is responsible for the unique properties of water

- a. Hydrogen bond
- b. Covalent bond
- c. Ionic bond
- d. (a) and (b)

11 – Water exists in.....in normal temperatures

- a. solid state only
- b. gaseous state only
- c. liquid state only
- d. all the previous answers

12 – The pure water boils at.....°C

- a. 100
- b. 37
- c. 42
- d. 0

13 - The pure water freezes at.....°C

- a. 4
- b. 100
- c. 0
- d. 37

14 – The density of pure water.....on freezing

- a. increases
- b. decreases
- c. is doubled
- d. remains constant



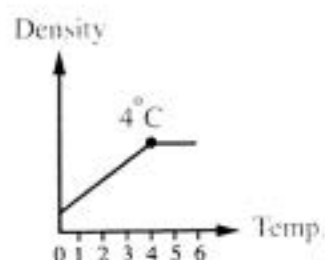
15 – The volume of pure water.....on freezing

- a. increases
- b. decreases
- c. is doubled
- d. remains constant

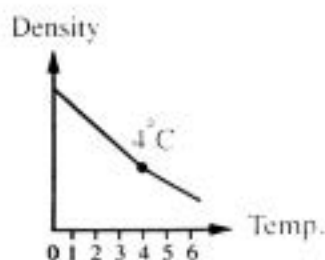
16 – The mass of pure water.....on freezing

- a. increases
- b. decreases
- c. is doubled
- d. remains constant

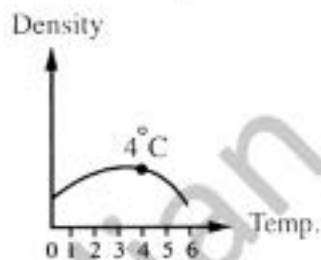
17 – The figure.....represents the change in water density by changing the temperature



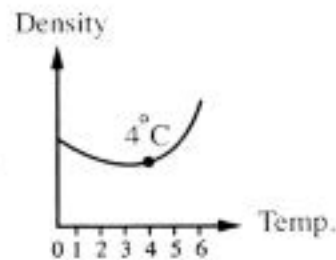
a.



b.



c.



d.

18 – The highest value of density of pure water is at..... $^{\circ}\text{C}$

- a. 0
- b. 4
- c. 100
- d. 42

19 – The lowest value of density of pure water is at..... $^{\circ}\text{C}$

- a. 0
- b. 4
- c. 100
- d. 37

20 – The density of pure water in its solid state is.....

- a. less than its density in liquid state
- b. equal to its density in vapour state
- c. greater than its density in liquid state
- d. less than its density in vapour state

21 – The **ratio** between the density of water at  $4^{\circ}\text{C}$  to its density at zero  $^{\circ}\text{C}$  is.....one

- a. more than
- b. less than
- c. equal to

22 – The density of pure water in the solid state is..... $1\text{ gm/cm}^3$

- a. more than
- b. less than
- c. equal to

23 - The volume of a quantity of water at  $10^{\circ}\text{C}$  is...the volume of the same quantity at  $1^{\circ}\text{C}$

- a. more than                      b. equal to                      c. less than

24 - A bottle is filled completely with water and put closed in the freezer.

After sometime, it breaks because when water freezes.....

- a. its density becomes less than its volume  
b. its volume increases without a change in its density  
c. its volume increases and its density decreases  
d. its density increases and its volume decreases

25 - When we put 1 litre of water at  $4^{\circ}\text{C}$  in the freezer to change it into ice, its mass.....

- a. increases                                      c. is doubled  
b. decreases                                      d. remains constant

26 - The snow crystals has.....shape

- a. octagonal                      b. pentagonal                      c. hexagonal                      d. quadrigonal

27 - Ice crystals are characterized by all the following except they have.....

- a. low density                                      c. large volume  
b. high density                                      d. hexagonal shape

28 - Water has a/an.....effect on litmus paper

- a. basic                      b. neutral                      c. acidic                      d. alkaline

29 - Hofmann's voltameter is used in water.....

- a. analysis                      b. electrolysis                      c. ionization                      d. acidification

30 - During the electrolysis of water, we add some drops of.....into water

- a. dilute HCl                                      c. dilute  $\text{H}_2\text{SO}_4$   
b. conc. HCl                                      d. conc.  $\text{H}_2\text{SO}_4$

31 - During water electrolysis, oxygen gas evolves at the.....

- a. anode                                      b. cathode                                      c. (a) or (b)





39 – All the following are natural water pollutants except.....

- a. volcanic eruption
- b. death of living organisms
- c. lightening accompanied thunder storms
- d. discharge of factories residues

40 – Mixing animals and human wastes with water causes.....pollution

- a. chemical
- b. biological
- c. thermal
- d. radiant

41 – All the following diseases are caused by biological pollution except.....

- a. cancer
- b. bilharzia
- c. hepatitis
- d. typhoid

42 – Increasing the concentration of.....in drinking water causes death of brain cells

- a. lead
- b. mercury
- c. arsenic

43 – Increasing the concentration of.....in drinking water causes blindness

- a. lead
- b. mercury
- c. arsenic

44 – Increasing the concentration of.....in drinking water causes liver cancer

- a. lead
- b. mercury
- c. arsenic

45 - .....pollution causes the death of marine creatures

- a. chemical
- b. thermal
- c. radiant
- d. biological

46 – Which of following behaviours causes radiant pollution?.....

- a. Leakage of radioactive materials from nuclear reactors
- b. Using water in cooling the nuclear reactors
- c. (a) and (b) are correct

47 – Putting water in empty glass bottles causing the plastic reacts with.....gas

- a. hydrogen
- b. chlorine
- c. fluorine
- d. oxygen

**48** – The water of a pool contains minerals, oxygen, organic fertilizers, animal wastes and green algae. What is the number of pollutants found in it?.....

- a. 1
- b. 2
- c. 3
- d. 4



## Quiz ③:

## Q (1): Choose :

- 1- ..... Is used in food preservatives.  
( chlorine – liquefied nitrogen – iodine – radioactive cobalt 60)
- 2- The reaction of ..... with water is considered stronger than the reaction of Na sodium in water.  
( Cl - K - C - Br)
- 3- The halogen elements belong to group.....  
( 1A - 2A - 6A - 7A )
- 4- The strongest alkali earth's metals in reaction with water is .....  
( Mg - Ca - Ba - Na )
- 5- ..... is considered from halogens.  
( Sodium – Chlorine – Helium – Calcium )

## Q (2): Give reasons :

- 1- Elements of group (1A) is called alkali metals.  
.....
- 2- Silicon slides used in the manufacturing of computers.  
.....
- 3- Coal is used in getting rid of the odour of the refrigerator.  
.....
- 4- The chemical activity of the alkali earth's metals increases with the increasing in atomic size.  
.....
- 5- Liquefied nitrogen is used in the preservation of eye cornea.  
.....
- 6- Sodium and potassium are kept under kerosene or paraffin.  
.....

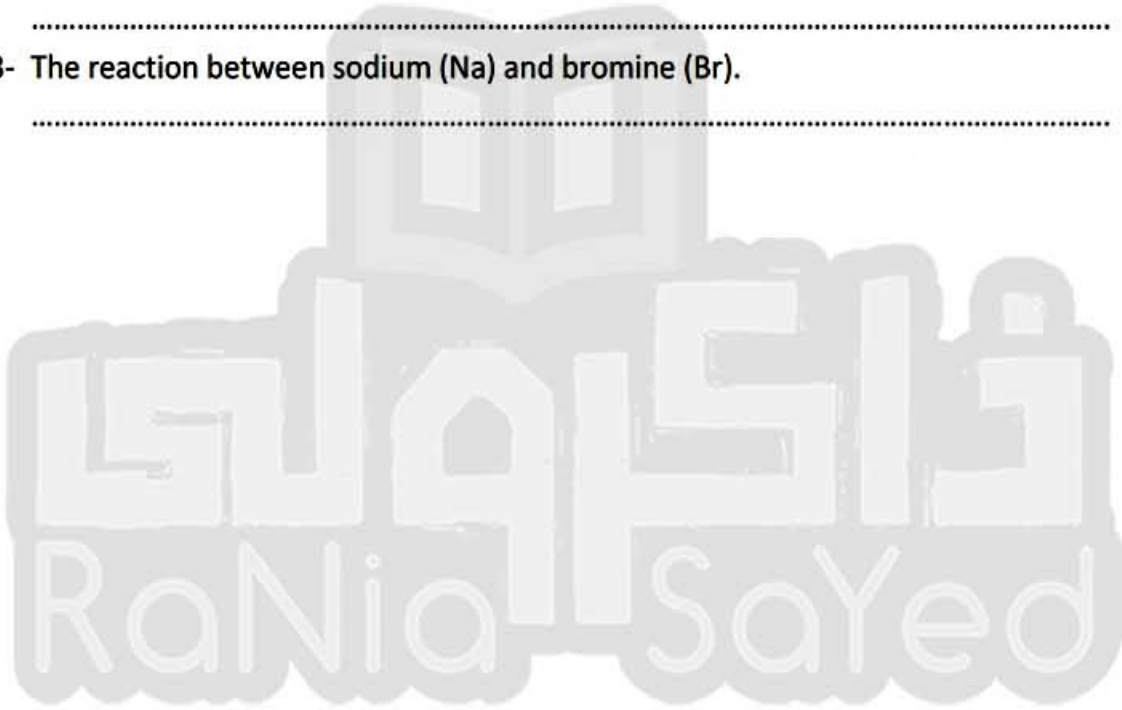


**Q (3) : What is the symbol which represents :**

- 1- The most active metal.
- 2- The most active non-metal.

**Q (4) : Show by balanced equations :**

- 1- The reaction between sodium (Na) and water(H<sub>2</sub>O).  
.....
- 2- The reaction between chlorine (Cl) and potassium bromide (KBr).  
.....
- 3- The reaction between sodium (Na) and bromine (Br).  
.....



## Quiz ④ :

Q. (1): Give reasons:

1- Presence of hydrogen bonds between water molecules.

.....

2- Pure water doesn't affect litmus papers.

.....

3- Although sugar is a covalent compound, it dissolves in water.

.....

4- Tap water should not be stored in plastic bottles of mineral water.

.....

5- Water has a high boiling and freezing points.

.....

Q. (2): What's meant by:

1- Water pollution.

.....

2- The latent heat of fusion.

.....

3- Ionization.

.....

Q. (3): How do we keep water from pollution?

.....

.....

.....

.....

.....

.....

.....



**Q. (4): What is the effect of the following on the water environment:**

1- Drainage of factories wastes in rivers and seas.

2- Using of rivers and seas water for cooling the nuclear reactors.

3- Mixing of animal and man wastes with water.

**Q. (5): Choose from (B) what suits (A) column:**

(A)	(B)
Probably harm	Responsible pollutant
1- Death of brain cells.	1- Lead
2- Cancer of liver.	2- Sodium
3- Blindness.	3- Mercury
	4- Arsenic

**لا تنس الاشتراك في  
قنوات ذاكرولي  
على تطبيق التليجرام**